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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,234	09/12/2003	John A. Moon	CV-0038A	6836
7590 09/13/2005				
Gerald L. DePardo CiDRA Corporation 50 Barnes Park North Wallingford, CT 06492			EXAMINER LAVARIAS, ARNEL C	
			ART UNIT 2872	PAPER NUMBER

DATE MAILED: 09/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/661,234	MOON ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Arnel C. Lavarias	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 7/7/05, 6/24/05, 5/16/05, 5/13/05.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 20-93 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 20-93 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/7/05, 5/16/05</u> .   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. With respect to the information disclosure statement filed 7/7/05, the citation 'WO-WO03/061983' was lined through since several pages of the reference were missing. Additionally, the citation 'OTHONOS...' in the 'Other Documents' section was lined through since a copy of that reference was not provided.

### ***Drawings***

2. The drawings were received on 5/13/05. These drawings are objected to for the following reason(s) as set forth below.
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:  
Figure 52- Reference numerals 686, 682  
Figure 53- Reference numerals 699,683,697,681,698.  
Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37

CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Response to Amendment***

4. The amendments to the title, specification, and abstract of the disclosure in the submission dated 5/13/05 are acknowledged and accepted. In view of these amendments, the objections to the specification in Sections 7-8 of the Office Action dated 1/11/05 are respectfully withdrawn.
5. The cancellation of Claims 1-19 in the submission dated 5/13/05 are acknowledged and accepted. In view of these amendments, the objections and rejections to the claims in Sections 9-23 of the Office Action dated 1/11/05 are respectfully withdrawn.
6. The addition of Claims 20-91 in the submission dated 5/13/05 is acknowledged and accepted.
7. The amendments to specification and abstract of the disclosure in the submission dated 6/24/05 are acknowledged and accepted.
8. The amendments to Claims 20, 55 in the submission dated 6/24/05 are acknowledged and accepted.
9. The addition of Claims 92-93 in the submission dated 6/24/05 is acknowledged and accepted.

***Priority***

10. In view of the amendments made to the specification of the disclosure, the Applicants' claim for domestic priority under 35 U.S.C. 119(e) and 120 is acknowledged. ***Response***

***to Arguments***

11. Applicants' remarks and arguments filed 6/24/05 and 5/13/05 have been fully considered. However, in view of the new reference to Gary et al., Claims 20-93 are now rejected as follows.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 20-27, 29, 31-33, 35, 37-41, 43-62, 64, 66-68, 70, 72-76, 78-91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel (U.S. Patent No. 6096496), of record, in view of Ravkin et al. (U.S. Patent Application Publication US 2003/0129654 A1), of record, and Gary et al. (U.S. Patent No. 5633975).

Frankel discloses an encoded particle and method for reading the encoded particle (See Figures 1, 8-15, 17), both the particle and method comprising a particle substrate (See 190, 125, 160 in Figure 1A); at least a portion of the substrate being made of a substantially single material (See for example 125 in Figure 1A) and having at least one or more thin diffraction grating embedded therein (See for example 902a-f in Figure 9;

1003a-f in Figure 10; 1103a-f in Figure 11; 1204a-f in Figure 12; 1401a-e in Figure 14; 1506a-i in Figure 15) at different locations on the substrate, the grating having a resultant refractive index variation at a grating location (it is noted that features appear as a variation of refractive index that alternates between the refractive indices of the materials comprising the grating); and the grating providing an output optical signal indicative of a code (See 180 in Figure 1A; col. 11, line 44-col. 12, line 43) when illuminated by an incident light signal propagating in free space (See 170 in Figure 1A), the code identifying at least one of the element and the chemical (In the instant case, the code may identify either the element or the chemical); and the chemical being attached to at least a portion of the substrate. Frankel additionally discloses at least one or more refractive index pitches superimposed at a grating location (See for example Figures 9-12, 14-15, 17); the substrate being made of glass (See col. 11, lines 27-43); the code comprising a plurality of digital bits, numbering for example 4 or 20 (See col. 11, line 44-col. 12, line 43), each bit having a plurality of states, each bit having a corresponding spatial location and having a value related to the intensity of the output signal at the spatial location of each bit (See also Figures 1A-B; 9-12, 15-15, 17); the incident light comprising at least one or more wavelengths (See col. 15, lines 6-12; col. 32, lines 4-21; col. 32, line 66-col. 33, line 25) from for example a laser; the dimensions of the bead, and hence the substrate being less than 2 mm (See col. 6, lines 65-67); the substrate having a reflective coating disposed thereon (See for example 904a-f in Figure 9); the substrate having a coating disposed on at least a portion of the substrate, at least a portion of the coating being made of a material, such as glass, plastic or polymer, that allows sufficient amount of incident

light to pass through the material to allow detection of the code (See for example 125, 125' in Figures 1A-B; col. 13, lines 36-53); the substrate having protruding sections (See for example Figures 9-12; 17); the substrate having an end and side view geometry that is circular or elliptical (See for example Figures 1A-B); a portion of the substrate having a 3-D shape of a cube with unequal sides or a sphere with nonuniform diameter (See for example 160, 190 in Figures 1A-B); the substrate having a grating region where the grating is located and a non-grating region where the grating is not located (See for example Figures 9-12; 14-15; 17); the substrate having a plurality of grating regions (See for example Figures 9-12; 14-15; 17); the grating region having a refractive index that is greater than that of the non-grating region (See for example Figures 14-15; col. 26, lines 44-67; in this particular case, the refractive index of 1501 near the grating 1506a-f is greater than the refractive index of a region in 1502b far away from the grating); the grating region having a refractive index that is not greater than that of the non-grating region (See for example Figures 14-15; col. 26, lines 44-67; in this particular case, the refractive index of 1501 near and away from the grating 1506a-f are the same); and the incident light being incident on the substrate along a longitudinal axis of the grating or at an angle to the longitudinal axis of the grating (See Figures 1, 9-12, 14-15, 17). Frankel lacks the output signal being a result of passive, non-resonant scattering from the grating when illuminated by the incident light signal, and the resultant refractive index variation being within the single material. However, Ravkin et al. teaches a similar, conventional system for multiplexed analysis of biological samples using coded particles (See for example Figures 33-51), wherein, instead of utilizing an active device coupled to the

diffraction grating to generate a coded signal when an input light is provided, the coded particles include the diffraction grating without active devices such that light incident on the coded particles is diffractively scattered toward a remotely located detection system (See for example Figures 33, 51). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the output signal in the particle and method of synthesizing a chemical on a substrate of Frankel, be a result of passive, non-resonant scattering, such as diffractive scattering, from the grating when illuminated by the incident light signal, as taught by Ravkin et al., for the purpose of reducing the size, weight, and complexity of the coded particles, since the additional elements and circuitry required for the active devices are no longer needed. The combined teachings of Frankel and Ravkin et al. lack the resultant refractive index variation being within the single material. However, Gary et al. teaches a conventionally coded optical substrate in the form of an optical fiber (See Figures 1-5), wherein the optical fiber is coded using a series of diffraction gratings in the form of Bragg gratings written in the core of the optical fiber (See Figure 4; col. 3, line 60-col. 4, line 22). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the resultant refractive index variation in the particle and method of Frankel and Ravkin et al. be within the single material of the substrate, as taught by Gary et al., for the purpose of reducing the size of the particle, providing a large number of codes, and protecting the diffraction grating from physical damage.

14. Claims 28, 30, 34, 36, 63, 65, 69, 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel in view of Ravkin et al. and Gary et al.



Frankel in view of Ravkin et al. and Gary et al. discloses the invention as set forth above, but does not specifically disclose the value of each bit corresponding to presence or absence of a corresponding refractive index pitch in the grating, and hence the value of each bit corresponding to the magnitude of refractive index variation of a corresponding refractive index pitch in the grating. However, Frankel does further teach that the presence or absence of a particular spectral color determines whether a particular bit in the code has a '1' or '0', corresponding to presence or absence of the spectral color respectively (See col. 11, line 62-col. 12, line 31). Since each bit is represented by a particular emitter structure (with associated grating(s)), it would have been a logical and obvious matter to one of ordinary skill in the art not have present a particular emitter structure (and its associated grating(s)) if that particular bit will always be '0'. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the optical identification element and particle and method for reading an encoded optical identification element and encoded particle of Frankel in view of Ravkin et al. and Gary et al. further include the value of each bit corresponding to presence or absence of a corresponding refractive index pitch in the grating, and hence the value of each bit corresponding to the magnitude of refractive index variation of a corresponding refractive index pitch in the grating, such as by permanently removing, or not including, a particular emitter or set of emitters (and their associated grating(s)) for those bits that will always be a particular value, namely '0'. One would have been motivated to do this to reduce the complexity, cost, construction, and size of the resultant optical identification element/particle.

15. Claims 42 and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel in view of Ravkin et al. and Gary et al. as applied to Claims 20 and 55 above, and further in view of Yguerabide et al. (U.S. Patent No. 6214560), of record.

Frankel in view of Ravkin et al. and Gary et al. discloses the invention as set forth above in Claims 20 and 55, except for the substrate having a magnetic or electric charge polarization. However, constructing the bead out of a material having a magnetic or electric charge polarization is well known in the art. For example, Yguerabide et al. teaches a method and apparatus for detecting one or more analytes by detecting the light scattered from the particles after the analytes have associated with the particles (See for example Abstract; Figures 21-24, 28-30). In particular, the particles are made of a material having electric or magnetic polarization to allow them to be oriented in the presence of an applied electric or magnetic field (See col. 12, lines 5-43; col. 40, lines 44-65; col. 88, line 24-col. 89, liner 20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the substrate having a magnetic or electric charge polarization, as taught by Yguerabide et al., in the particle and method of Frankel in view of Ravkin et al. and Gary et al., for the purpose of facilitating or optimizing readout of the codes in the element/particle by proper alignment of the element/particle.

16. Claims 92-93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel in view of Ravkin et al. and Gary et al.

Frankel in view of Ravkin et al. and Gary et al. discloses the invention as set forth above in Claims 20 and 55, except for the substrate being photosensitive at least at the

grating location. However, it is well known and conventional in the art to write Bragg gratings in optical fiber that have photosensitive cores. Official notice is taken. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the substrate of the particle and method of Frankel in view of Ravkin et al. and Gary et al. be photosensitive at least at the grating location, to facilitate and simplify inscribing the Bragg diffraction grating into the substrate.

### ***Conclusion***

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2872

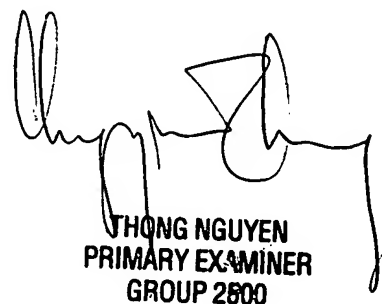
18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnel C. Lavarias  
8/30/05



THONG NGUYEN  
PRIMARY EXAMINER  
GROUP 2800

OFFICE  
MAY 13 2005  
BRITISH TRADE MARK OFFICE

CORRECTED

3/23

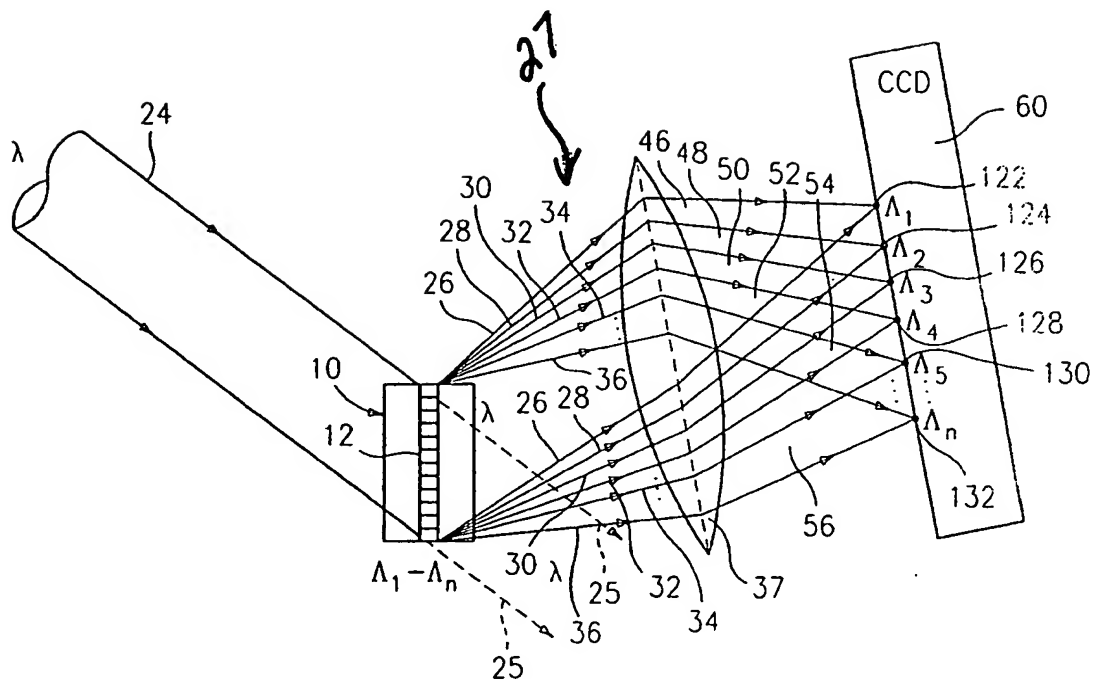


FIG. 6

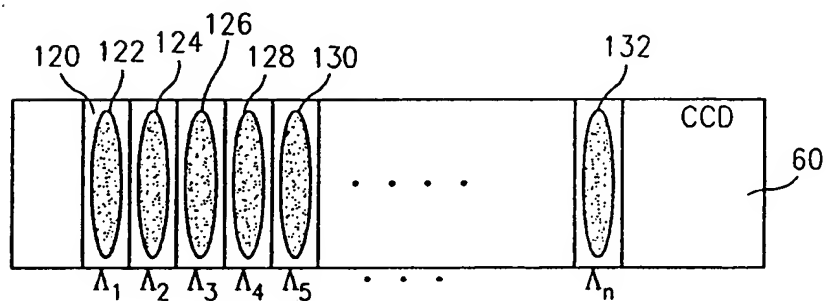


FIG. 7

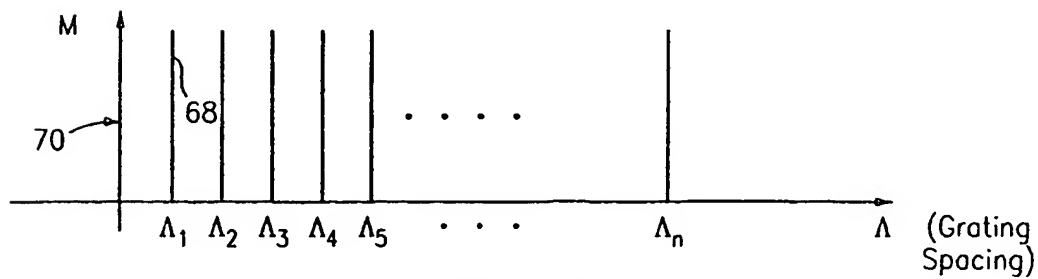


FIG. 8

Drawing Changes  
Approved  
AC  
8/29/05

CORRECTED

5/23

Illustration of refractive index profile for single grating with a period of 1 micron

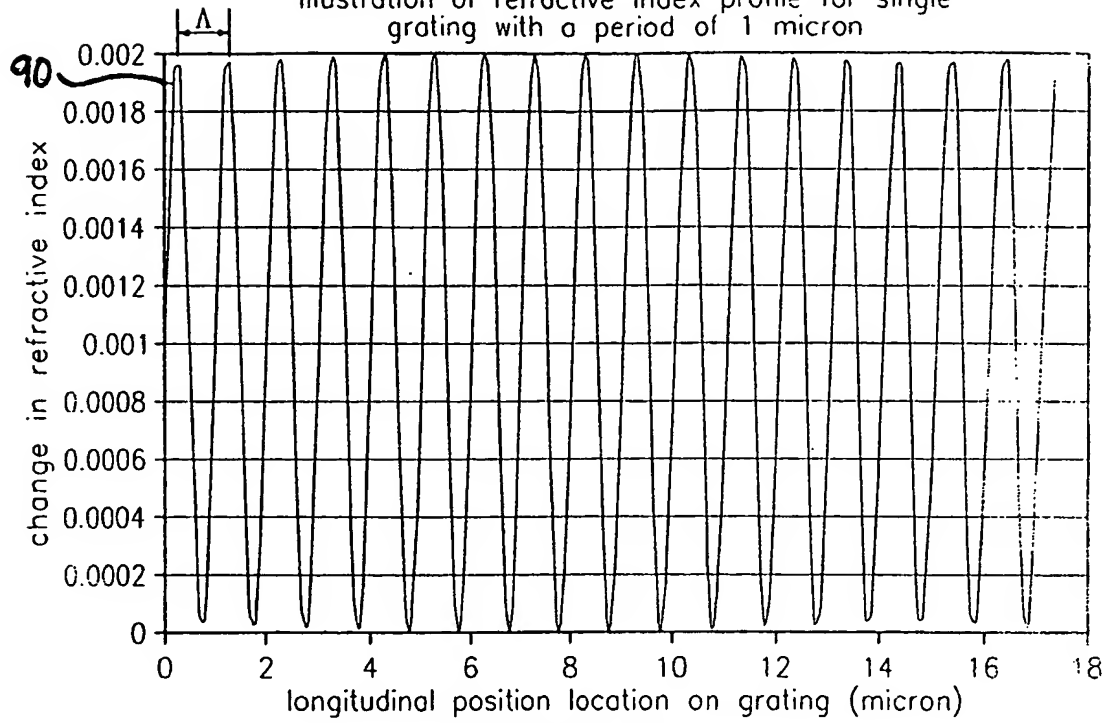


Illustration (a)

Illustration of refractive index profile for 3 colocated gratings whose period vary by 0.3%

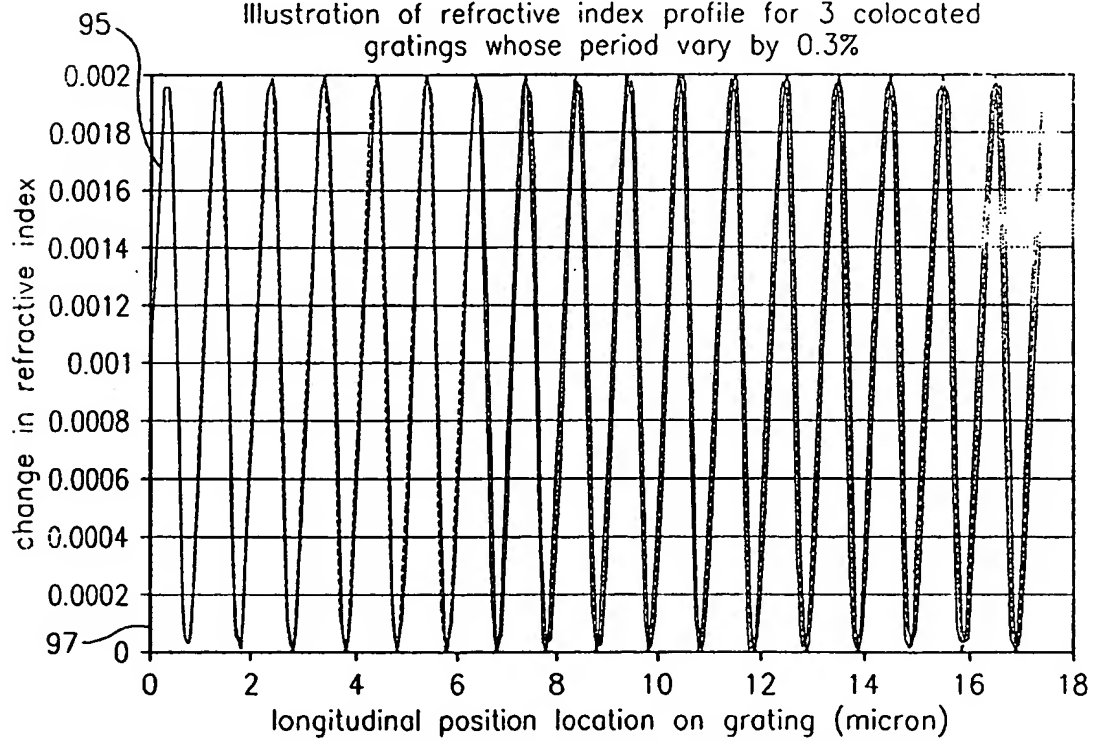


FIG. 10

--- grating 1    - - - - - grating 2    — grating 3

Illustration (c)

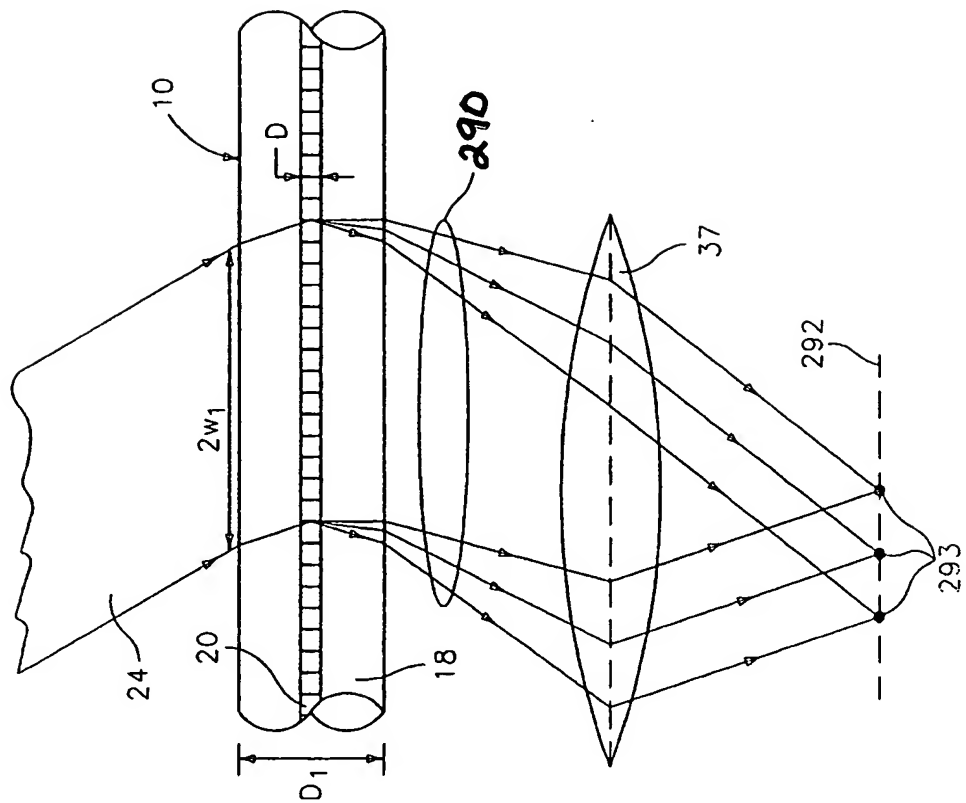


FIG. 14

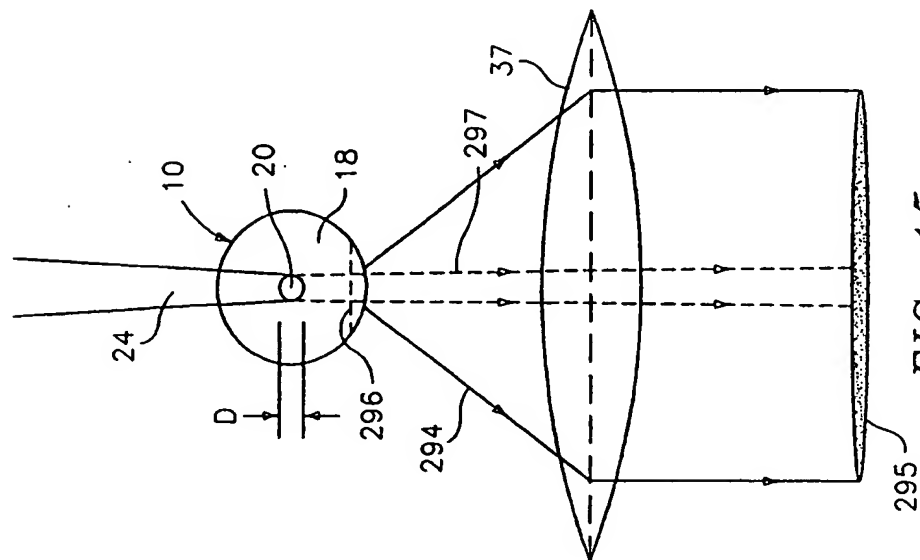


FIG. 15

CORRECTED

12/23

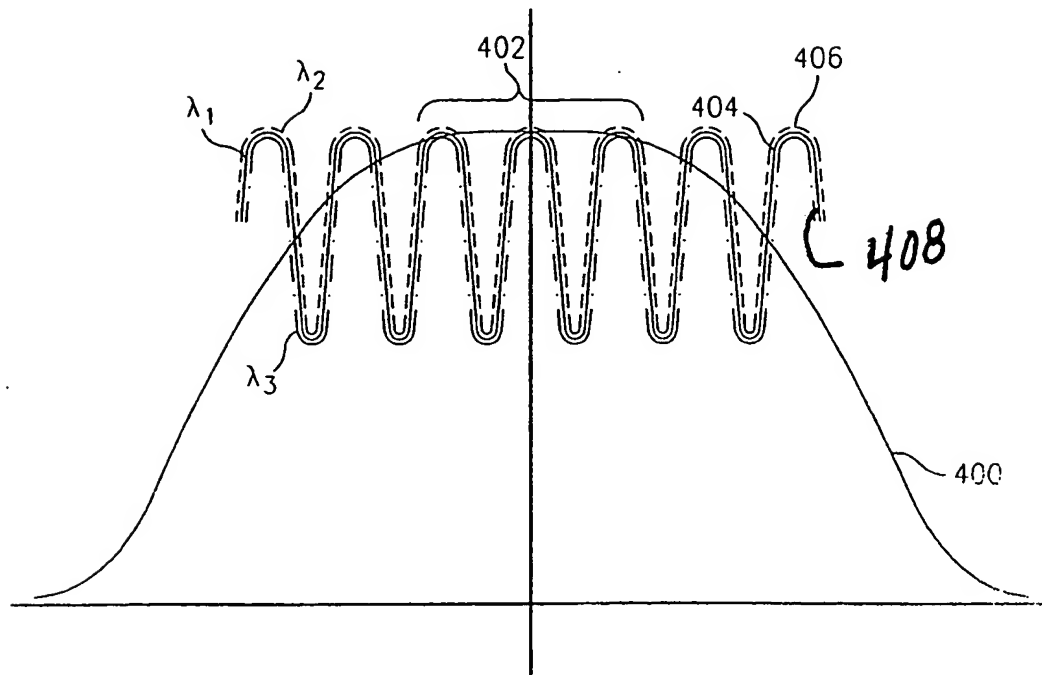


FIG. 22

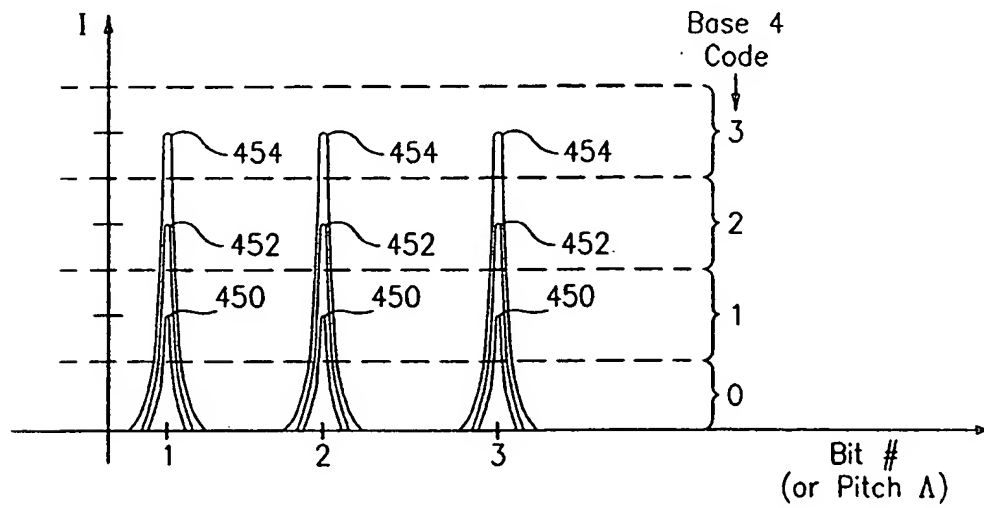


FIG. 27



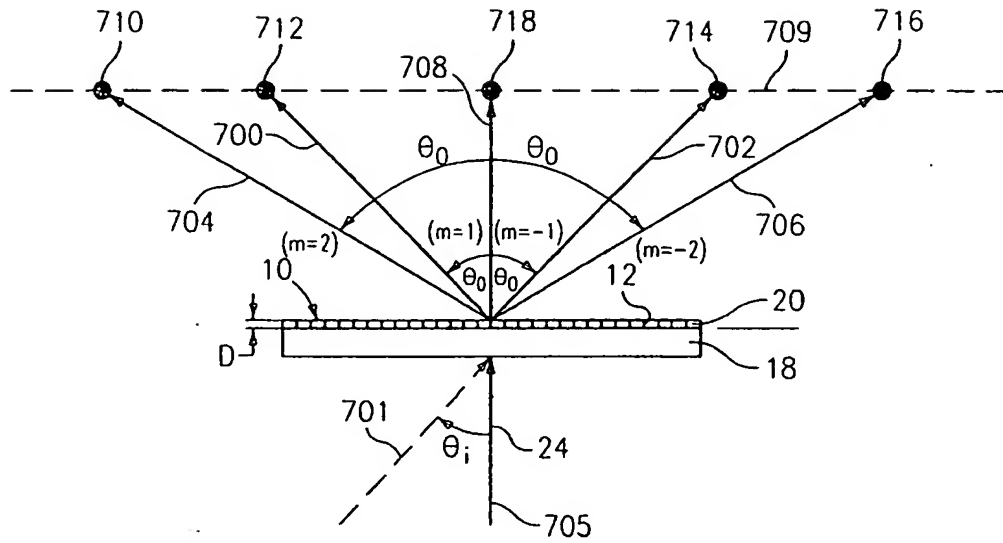


FIG. 23

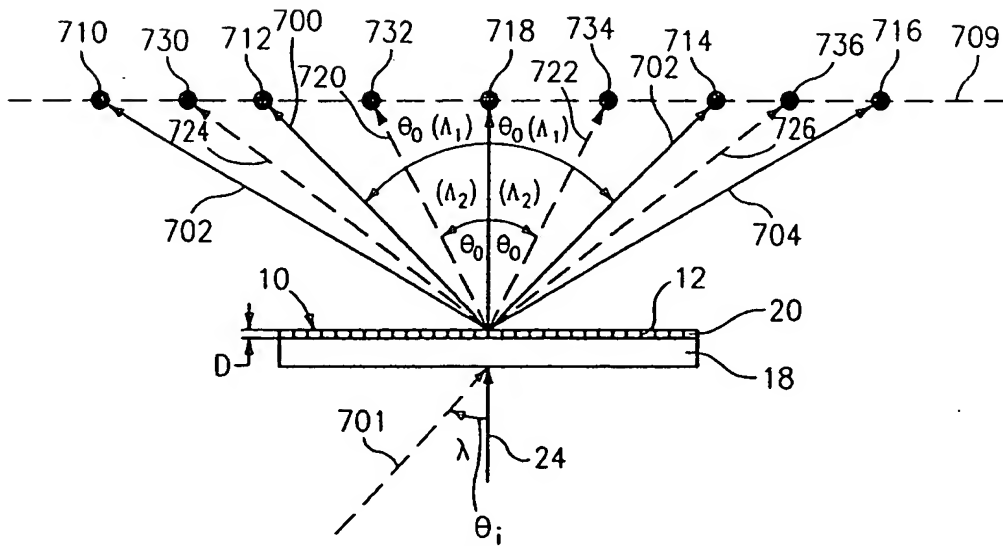


FIG. 24

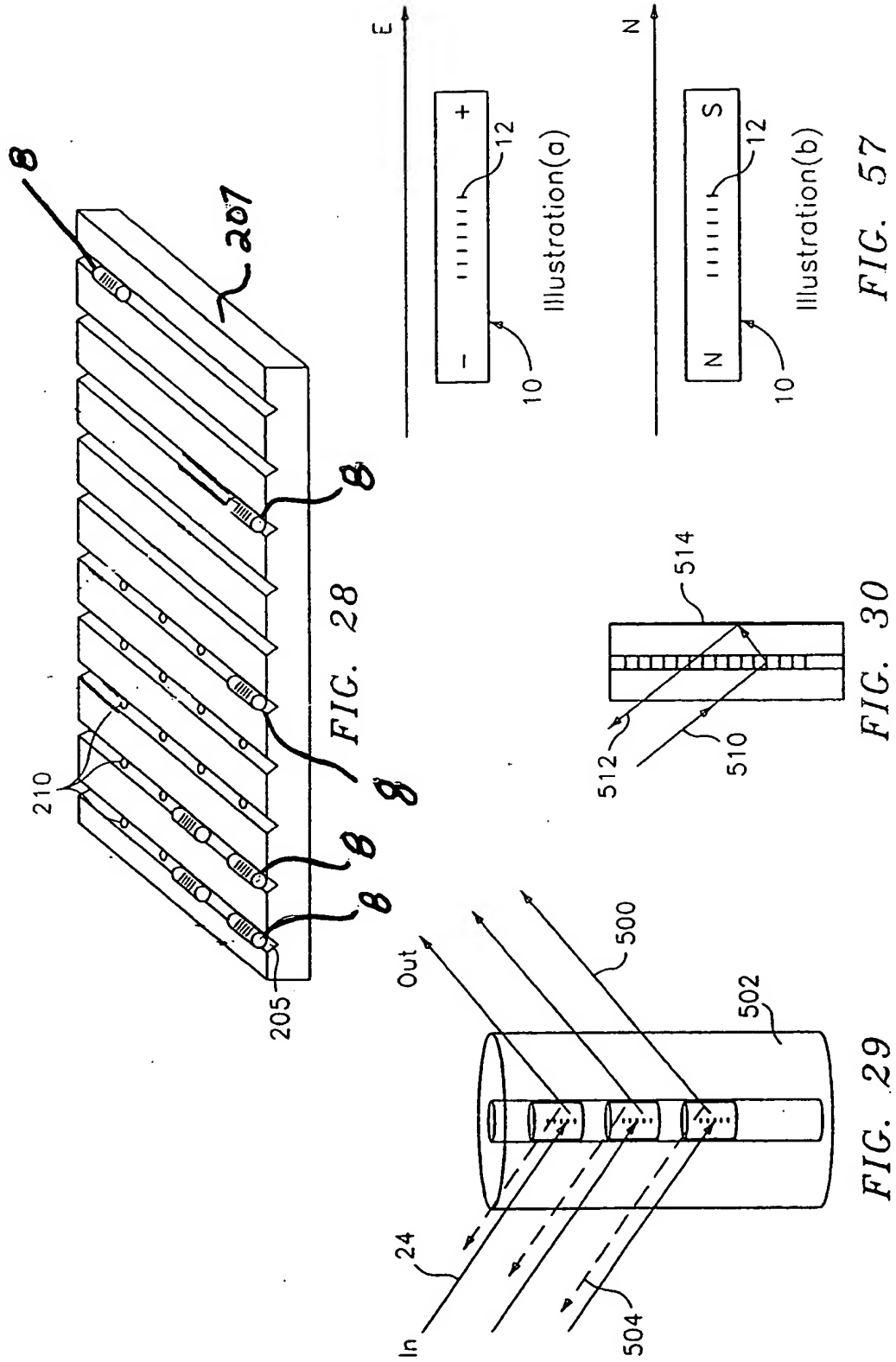


FIG. 28

FIG. 30

FIG. 29

FIG. 57

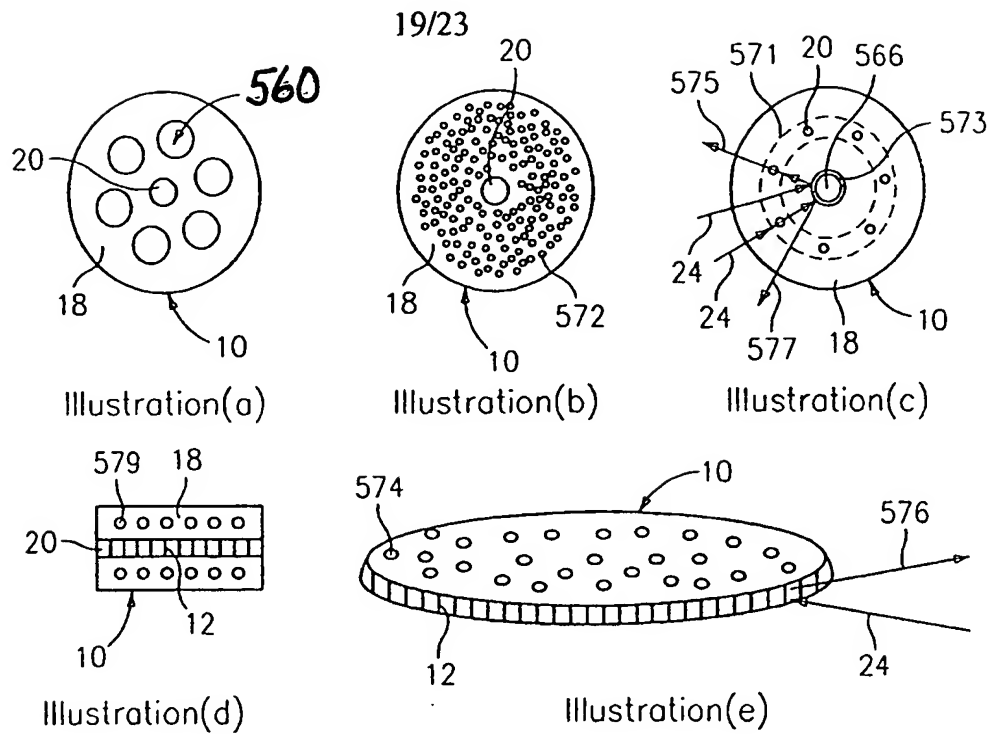


FIG. 41

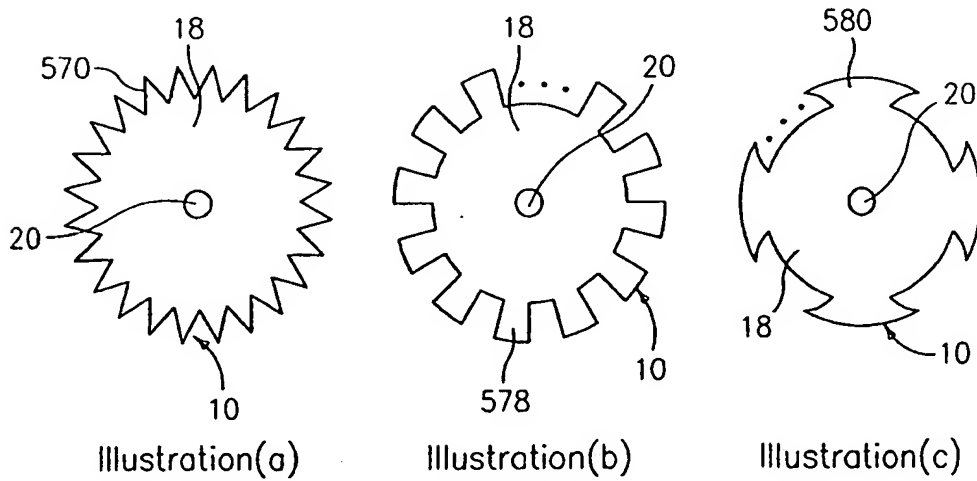


FIG. 42

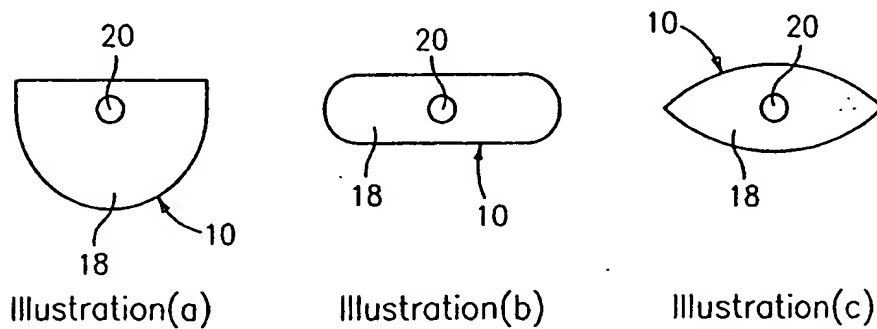


FIG. 43

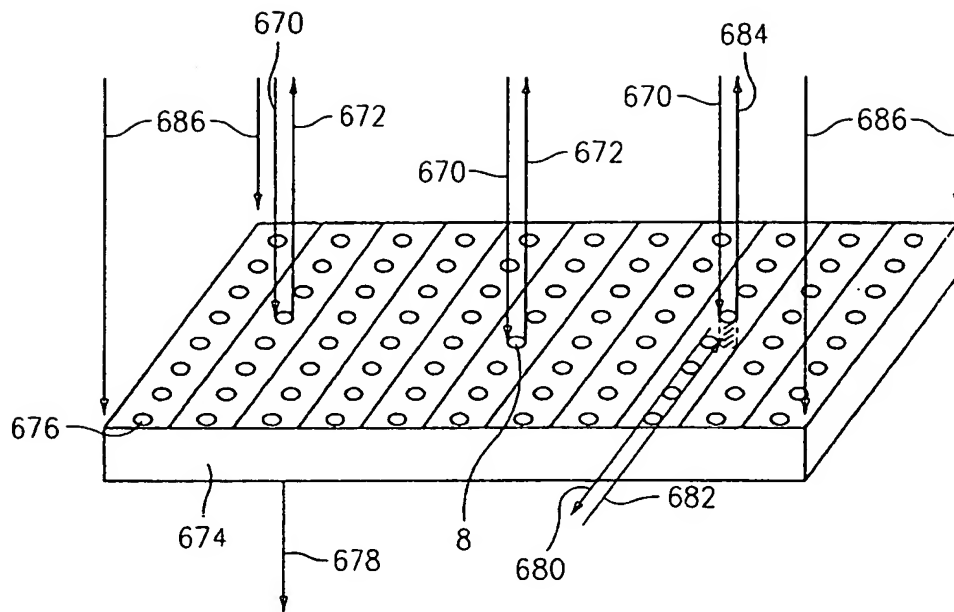


FIG. 52

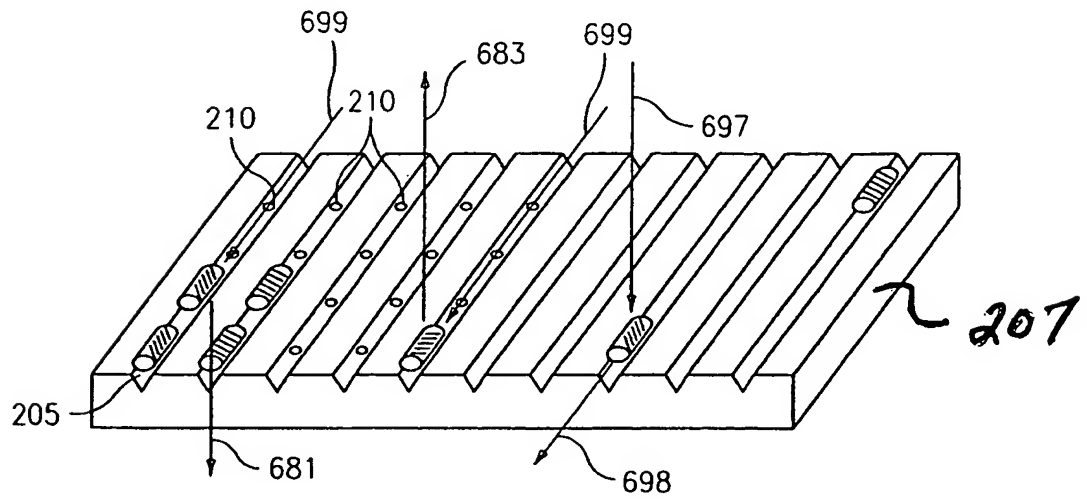


FIG. 53